Before the

Federal Communications Commission

Washington, D.C. 20554

In the Matter of	)	
	)	
Redevelopment of Spectrum to	)	
Encourage Innovation in the	)	ET Docket No. 92-9
Use of New Telecommunications	)	
Technologies	)	

COMMENTS OF THE SATELLITE BROADCASTING AND COMMUNICATIONS ASSOCIATION

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I. INTRODUCTION

The Satellite Broadcasting and Communications Association (SBCA) is pleased to submit to the Commission its comments regarding the issues raised by the Further Notice of Proposed Rule Making (FNPRM) in ET Docket No. 92-9 and the jointly considered Rulemakings, RM-7981 (UTC) and RM-8004 (Alcatel).

SBCA is the national trade association of the satellite broadcasting industry and represents all of the major segments which are involved in supplying satellite home viewers with direct-to-the-home video and audio programming. These segments include the companies which manufacture, own, operate and/or lease satellite transponders; the programmers who offer subscription services to home viewers; the satellite carriers which uplink and retransmit superstation and over-the-air network signals to the

home (in so-called "white areas" only); the manufacturers of receiving equipment and hardware; and the distributors and retailers who deal directly with consumers in the sale of home satellite dish (HSD) equipment and programming.

SBCA is extremely concerned that the list of frequency bands identified in the FNPRM as available for reaccommodation of existing 2 GHz fixed microwave operations continues to include two bands which are vital to the present operation and future growth of satellite broadcasting. These are the C-band downlink and uplink frequencies at 3.7-4.2 GHz and 5.925-6.425 GHz respectively.

SBCA was heartened to see the Commission reject the Alcatel proposal which would have downgraded Fixed-Satellite Service (FSS) operations in the upper and lower 40 MHz of the 3.7 - 4.2 GHz allocation to secondary status. This decision recognized the significant FSS operations existing in the band. In spite of the Alcatel decision, the Commission is now proposing to allow the displaced 2 GHz Private Operational-Fixed Microwave operations to be displaced by this FNPRM to enjoy co-primary status with the FSS. The Commission also put forth a rechannelization scheme for the 4 GHz band which could well devastate FSS operations.

As explained below, the addition of up to 23,000 Private Operational-Fixed Microwave links at C-band would seriously aggravate the existing problem of terrestrial interference (TI) for

the 3.9 million home satellite dishes (HSD) in this band. The TI caused by spectrum sharing with the existing Fixed Service operations in the 3.7 - 4.2 GHz band already either totally precludes HSD reception in many areas or makes it necessary for the homeowner to invest in expensive additional interference suppression equipment. The addition of operational fixed links, especially if they follow the proposed rechannelization plan, would disrupt the carefully crafted and adhered to spectrum sharing plan in existence between the Fixed Service and the Fixed Satellite Service and would pose insurmountable problems for a large number of both existing and future HSD owners.

Quite apart from SBCA's concern over which bands might be used to accommodate existing services displaced from the proposed "Emerging Technologies" band is the fact that the decisions of WARC-92 have largely superseded the premises and conclusions of the FCC Staff Study on which the FNPRM is based (FCC Report OET/TS 92-1). As detailed in Section VI below, WARC-92 has allocated new (or identified existing) bands for each of the new technologies that the Commission cites to justify the need for the new domestic allocations that it has proposed near 2 GHz (original 92-9 NPRM at para 4).

Only in the case of personal communication services (PCS) do the bands identified by WARC-92 partly coincide with the bands proposed for all new technologies by the Commission. And even here,

implementation of the WARC bands will raise issues that go far beyond those contemplated in the FNPRM. Furthermore, the bands allocated by WARC-92 for other emerging technologies will displace a wider range of existing services than those considered by the FNPRM. In view of this, SBCA makes the following recommendations: 1) That the Commission rescind its proposal to include the operational fixed service in the 3.7 - 4.2 GHz band and to exclude this band from further consideration on any basis, and 2) Set aside the other proposals in the present FNPRM until the Commission has had the time to review the entire set of issues raised by the emerging technology allocations and regulatory actions taken by WARC-92.

II. THE HSD INDUSTRY HAS GROWN INTO A STRONG VIDEO COMPETITOR FOR MANY TV HOUSEHOLDS TO SELECT FROM AND THE SOLE MULTICHANNEL VIDEO SOURCE FOR MANY OTHERS.

The home satellite industry began in 1976, and, at first, developed slowly as a "cottage industry." By 1980 however, limited quantities of satellite reception systems were available to the public, and in that year, 5,000 systems were installed nation-wide at a cost of over $10,000 each. The price of complete systems dropped rapidly in the early '80's which fueled a boom in satellite system sales. In 1985 alone, the industry shipped 735,000 systems at an average cost of $3000 - $3500.

Although the introduction of scrambling in January 1986 caused a downturn, the industry recovered well and is shipping new systems at an annual rate of about 350,000 units at an average cost of $2500 per installation.

The Home Satellite Industry Has Emerged as an Important Local Video Competitor

Today, almost 4 million Americans have invested in a home satellite system. That number continues to increase by approximately one million units every three years.

Perhaps surprisingly, a large fraction of HSD owners have chosen satellite in preference to other available media. Over 42% of HSD installations are within cable franchised areas. Some 30% of satellite systems are in metropolitan or suburban areas. Despite an average system cost of $2,500 including installation, consumers in growing numbers are choosing satellite TV. The reasons for purchase are numerous, but key among them is the desire on the part of the consumer to have personal choice in the selection of programming; cost savings as compared to cable (a package of 2 premium services and 15 basics averages about $22 per month via satellite -- about 40% less than cable); and the superior audio and video quality offered by satellite TV.

Indeed, home satellite television has become the best consumer electronics investment on the market today. Dish owners enjoy access to some 200 channels of video programming and over 75 audio services throughout North America. Only satellite offers video which equals laser disc in sharpness and CD quality digital surround-sound audio.

HSD Offers The Only Source of Multichannel Video to over 2 Million "White Area" Households

Of the approximately 95 million TV households in the United States, nearly 2 million are located in so-called "white areas," namely, "unserved households" which cannot receive an adequate off-air network TV signal. For these households, a satellite dish is their only multichannel video connection to the rest of the world.

The importance of service to these areas was recognized by the Congress when it passed the Satellite Home Viewers Act of 1988. The legislation established a Satellite License in Section 119 of the Copyright Act which grants satellite carriers the right to retransmit network broadcast signals to "unserved households," as well as superstations to any HSD subscriber in the U.S. Several hundred thousand American citizens now have access to network signals via HSD as a result of the license. However, Section 119 is scheduled to sunset on December 31, 1994. SBCA is currently seeking a means to continue the availability of broadcast signals

to HSD owners after the sunset date and has asked Congress to extend the license.

While these "white area" households comprise only about 2% of the total TV households in the United States, they are households which simply can not be served by other multichannel video technologies. They are located in remote areas where cable service is neither available today, nor likely ever to become available due to the high cost of physical plant. Many of these households are in such sparsely populated regions that MMDS service also is not a viable option. Thus, HSD is their only choice if they desire multichannel video.

The FCC and Congress Have Consistently Supported the Development of "Alternative Technologies" Such as HSD.

The Commission deserves credit for its efforts to support the development of alternative technologies such as HSD. In 1986 the FCC enacted a limited pre-emption of local zoning regulations. It was designed to help the industry overcome the maze of restrictions placed on satellite installations by local governmental entities. As the Commission is well aware, this limited pre-emption has not fully resolved the problem of public zoning restrictions. The Commission recently acted again on the issue, striking down the satellite dish zoning ordinance of the Town of Deerfield, NY. The

Town has now appealed the FCC's decision to the U.S. Court of Appeals.

The Commission is also considering a Petition for Rule Making submitted last year by the SBCA which asks the FCC to clarify and strengthen its policy on zoning. It is SBCA's sincere desire that the Commission move quickly to restate the basic right of consumers to own a satellite antenna.

Congress, too, has played an important role in encouraging HSD development. As discussed above, the 1988 Satellite Home Viewers Act, recognized the important role of HSD in providing television service. The HSD industry also was recognized as an important emerging competitor to cable in the recently enacted Cable Consumer Protection Act of 1992 (S.12). The program access provision which played such a major role in the passage of S.12, will be the subject of an important rulemaking by the FCC in the very near future.

The introduction of the private operational fixed service into the 4 GHz band stands to undermine the development of the HSD industry which the Commission and Congress have encouraged through their policies on zoning and home viewers rights.

III. THE GROWTH OF THE HSD INDUSTRY IS ALREADY HAMPERED BY FIXED SERVICE OPERATIONS

As the HSD industry continues to develop, many areas of the country are experiencing restraint of growth by the spectrum sharing requirements the industry must already contend with. The difficulties of frequency sharing in the 4 GHz band were recognized in comments filed earlier in this proceeding by the incumbent 2 GHz operators and equipment manufacturers, including The Large Public Power Council; Alcatel; TeleSciences, Inc.; Harris Corporation; and NRECA. SBCA endorses those comments.

As the Commission is aware, the satellite industry already shares C-band uplink and downlink allocations with Fixed Service operators today. This sharing has placed significant restrictions on the HSD industry, especially in the 3.7 - 4.2 GHz allocation (C-Band downlink). C-Band reception in areas near 4 GHz Fixed Service transmission towers and transmission paths is possible only by utilizing expensive avoidance/suppression techniques. These often work to limit the availability or affordability of HSD systems.

Antenna placement is an important consideration for obtaining the required line-of-sight paths to the satellite orbital arc. For example, consumers with a roof mount risk greater terrestrial interference from the 4 GHz Fixed Service. It is a "catch-22." An

antenna at ground level and using the surrounding buildings and terrain to assist in shielding from TI, loses access to several satellites; on the roof, it faces heavy interference from Fixed Service operations, which must then be suppressed at the home owner's expense.

With today's frequency modulated satellite TV transmissions, and with current microwave relay channeling plans, a certain degree of TI suppression can be achieved through the use of "band-pass" and "notch" filters. The problem of TI is so widespread that these filters are built-in to many of the high-end receivers available on the market today. The consumer pays a sizable premium for this feature however, and it is generally not available on the moderately priced units. Consumers who have units without internal TI filters are forced to purchase an external filter in order to reduce TI. These filters are installed either inside the house at the receiver or outside at the feed assembly. A typical "band-pass" filter suitable in cases where TI is moderate can cost a consumer approximately $200.

If the problem is severe, "notch" filters are utilized. They are custom tuned to attenuate the offending wide-band microwave signal (offset from the desired C-Band signal by 10 MHz). These filters carry wholesale prices ranging from $350 for a "single notch" to $780 for a unit capable of notching out six offending carriers. Special microwave absorption pads mounted on the surface of the

antenna to improve sidelobe performance are also required in some cases. These pads, which cost about $100, help attenuate the interfering signal. Finally, many consumers faced with TI may be forced to purchase so-called "deep" dishes which help shield the feed assembly from the microwave interferences. These "deep" dishes cost approximately $400 more than a "regular" satellite antenna. Thus, the total price tag for interference suppression can easily run from $700 to $1,000 over and above the system cost.

The negative impact of terrestrial interference on the HSD industry cannot be overstated. For example, Davis Antenna, a satellite installation company based in Waldorf, MD, has estimated that up to 80% of the attempted C-Band installations within the downtown Washington, D.C. area could not be successfully completed due to interference from existing Fixed Service operations. While no comprehensive data exists on the level of TI nationwide, SBCA is aware of many other such areas where TI is a serious problem.

It is also important to note that TI, while most serious in metropolitan areas, is not limited to major population centers. As the Commission is well aware, 4 GHz Fixed Service operations are spread across the country. Long haul microwave links criss-cross America, posing the same interference problems for HSD owners in rural areas.

IV. THE COMMISSION'S PROPOSAL TO RECHANNELIZE 4 GHz FIXED SERVICE OPERATIONS COULD RENDER HSD USE OF THE BAND IMPOSSIBLE FOR BOTH EXISTING AND NEW INSTALLATIONS.

The HSD industry's ability to share the 4 GHz band with the existing Fixed Service transmitters, while difficult and expensive, is made possible today only because of the spectrum sharing plan developed some two decades ago by the FCC, and the fact that the number of FS operators is not increasing rapidly. This plan channelizes the 4 GHz band into 20 MHz "wideband" Fixed Service channels, aligned with the 40 MHz channels of the Fixed Satellite Service in such a way that the FSS operators can "interleave" their transponders between the 20 MHz wide FS channels. This plan allows for an "off-set" of plus or minus 10 MHz between the "center frequency" of the satellite transponder and the Fixed Service carrier. Sharing of the 4 GHz band is possible only as a result of this channelization plan and the subsequent order it has created in the utilization of this band.

The rechannelization proposal contained in the FNPRM would totally upset the carefully crafted plan on which current sharing is based. Rechannelization would destroy the intricate and successful frequency "off-set" tool. Interfering FS carriers could be located virtually on the same frequencies as the TV carriers in the satellite transponders. The HSD industry simply could not operate

in such an environment due to the interference which would result. SBCA is aware of no technical solution which would allow sharing between the FS and the FSS if this plan was adopted. Existing TI filters would be useless because they are designed to attenuate FS carriers at plus or minus 10 MHz from the center frequency of the transponder. Thus, the tremendous investment made by consumers in TI suppression equipment would be wasted.

The operation of scrambling systems would also be negatively impacted. Any attempt to narrow the bandwidth of the HSD receiver to filter out interference results in a loss of data from the respective transponder. Even in the current sharing environment the operation of consumer decoders can be degraded in areas of high TI. Location of interfering carriers closer than 10 MHz away from the center frequency of the transponder would likely render the decoder inoperable.

Thus, it should be clear to the Commission that the rechannelization of the 4 GHz Fixed Service operations would lead to chaos not only to HSD users but to the Fixed Satellite Service in general. SBCA opposes any proposal to disrupt the existing Fixed Service channelization scheme.

V. SATELLITE DELIVERY OF DIGITAL VIDEO WOULD BE SEVERELY THREATENED BY THE COMMISSION'S PROPOSAL

The foregoing comments on the impact of the proposals in the FNPRM are applicable to the FM carriers currently used for TV transmission in the FSS. Within the next few months however, digitally compressed and digitally modulated video signals to be begin being delivered via satellite. Announcements of digital transmission plans have recently been made by PBS, Viacom, HBO and TCI with operational broadcasts to begin in 1993.

Unlike the C-Band analog FM transmissions which concentrate most of the modulated signal power at the center of the transponder, digital TV signals would be spread across the entire transponder bandwidth. Any use of TI filters to "notch out" FS carriers would result in the loss of a portion of the digital satellite signal, rendering it unusable. For this reason, TI may well pose an insurmountable threat to the satellite delivery of digital video for all homes lying in or near a Fixed Service microwave transmission path.

For the same reason, the future delivery of Advanced Television (ATV) signals via satellite will also be impacted by TI. The SBCA is active in the FCC ATV planning process through membership in PS/WP-4 and its Working Group on Satellite Testing of ATV. This Working Group has identified TI as a potentially significant problem facing ATV proponents. The Working Group is currently seeking data from the various ATV proponents to determine how their

systems will perform in a TI environment. This information will be shared with the Commission when available.

For these reasons, it is imperative that the Commission exclude the 4 GHz and other HSD downlink allocations from consideration as possible reaccomodation bands.

VI. ADOPTION OF THE PROPOSALS CONTAINED IN THE FNPRM COULD ALSO HARM OTHER MULTICHANNEL VIDEO PROVIDERS.

Despite all of the formidable obstacles to its development, the HSD industry has emerged as a viable competitor in the multichannel video delivery market place. In comments filed earlier this year in the ET 92 - 9 Docket, SBCA argued that, alone among the various multichannel video delivery technologies, the HSD industry would bear the impact of the reaccommodation. However, it should be evident that adoption of the reaccommodation and rechannelization plans would not only affect the HSD industry, but also other multichannel video providers which rely on C-Band satellite reception for their programming. These include cable operators, "wireless cable" (MMDS), and Satellite Master Antenna Systems (SMATV). While the HSD industry would likely suffer the most due to the large number of consumers spread across all 50 states, these other technologies would also be negatively impacted by the Commission's proposal to relocate the Fixed Service operations from the 2 GHz band.

Although cable operators use C-Band satellite receiving antennas which are generally larger and afford greater TI protection than HSD antennas, only a small percentage of these cable headend facilities were "licensed" before the Commission removed the licensing requirement. Since new Fixed Service operations would presumably be required to coordinate their operations only with those cable facilities which have completed the licensing process, most cable operators would be vulnerable to interference from the displaced 2 GHz private operators. These operations would face the same limitations as HSD owners on the ability to suppress TI located closer than 10 MHz from the center of the transponder.

SMATV and MMDS operators will also face a similar problem because many of these operations use "unlicensed" C-Band receiving installations for reception of satellite-delivered programming. Their ability to compete with other delivery systems would suffer even more than that of cable TV since the cost of suppressing the TI (if it can be done at all) would generally be borne by a smaller number of subscribers and so have greater impact on monthly rates or operating profits.

Thus, adoption of the 4 GHz band reaccommodation proposals could impact not only the 3.9 million HSD systems in operation, but many millions of other television viewers who enjoy programming delivered via C-Band satellite and cable TV, SMATV, and MMDS systems.

VII. THE ACTIONS OF WARC-92 HAVE SUPERSEDED THE PRESENT RULE MAKING

In support of the need for "emerging technologies" bands, the Commission cited several examples of requests for new services for which sufficient spectrum is allegedly unavailable (NPRM at para 4). These examples include 200 MHz for new personal communications services (PCS); 40 MHz for data PCS; 33 MHz for a generic mobile-satellite service (MSS); 70 MHz for a digital audio broadcasting service; and 33 MHz for low-Earth orbit (LEO) satellites. To meet such requirements, the Commission proposes to reallocate for new technologies 220 MHz of the spectrum currently used for fixed microwave services in the band 1850-2200 MHz. The specific candidates for reallocation are the subbands 1850-1990, 2110-2150, and 2160-2200 MHz.

In the month that followed adoption of the NPRM, however, WARC-92 answered the spectrum needs of these new technologies in a different and much more comprehensive manner. Instead of three sub-bands around 2 GHz to accommodate all of the emerging technology requirements, WARC-92 made the following international allocations available to the United States:

- 230 MHz for PCS and data PCS (the Future Public Land Mobile Telecommunication System, FPLMTS) at 1885-2025 and 2110-2200 MHz

- 75 MHz in each direction for MSS at 2160-2200 and 2500-2535 MHz for downlinks, and 1970-2010 and 2655-2690 MHz for uplinks (an additional 33 MHz of downlink spectrum at 1492-1525 MHz and 35 MHz of uplink spectrum at 1675-1710 MHz were also allocated for MSS in Region 2 but the U.S. excluded itself from these allocations)

- 50 MHz for digital audio broadcasting at 2310-2360 MHz (this allocation applies only in the U.S. and India); an additional 40 MHz was allocated at 1452-1492 MHz for all countries except the U.S., and another 120 MHz at 2535-2655 MHz for 12 countries in Region 3 and the northeastern part of Region 1

- A total of about 5 MHz in each direction for "little" LEOs at frequencies near 138, 149, 315, 390, and 400 MHz (including both primary and secondary allocations)

- 16.5 MHz in each direction for "big" LEOs at 1610-1626.2 MHz for uplinks (and some downlinks) and 2483.5-2500 MHz for downlinks

In addition, WARC-92 allocated 500 MHz of spectrum in Region 2 for a new technology not considered in the NPRM: wide RF band HDTV broadcasting. Specifically, WARC-92 allocated the band 17.3-17.8 GHz to the broadcasting-satellite service (BSS) for HDTV, extended the upper limit of the existing BSS feeder link band at 17 GHz to 18.4 GHz, and provided a new feeder link band at 24.75-25.25 GHz.

Nearly all of the foregoing emerging technology allocation actions of WARC-92 were accompanied by footnotes and resolutions specifying when and how the bands could be implemented.

It is evident that the WARC-92 decisions go much further in providing spectrum for emerging technologies than do the proposals in the NPRM. More spectrum is provided; many additional frequency bands are involved; and services other than fixed microwave will be subject to sharing and/or reaccommodation in other bands. Moreover, the international procedures for implementing the WARC-92 new technology bands and for protecting existing services in these bands are much more complex than those contemplated in the NPRM.

For all of these reasons, SBCA concludes that the premises and conclusions of the FNPRM should not be finalized until the Commission has dealt in a comprehensive and systematic manner with all of the new technology bands allocated at WARC-92. In no case, however, should the 3.7 - 4.2 GHz FSS band be considered further as a candidate for reaccommodating displaced 2 GHz systems.

VIII. FREQUENCY BANDS THAT MEET THE COMMISSION'S CRITERIA FOR CONSIDERATION AS REACCOMMODATION BANDS CONTINUE TO BE NEGLECTED IN THE FNPRM.

To reaccommodate the existing fixed microwave users that might be displaced by the reallocation of parts of the 1850-2200 MHz band for new services and technologies, the Commission listed seven frequency bands in its original NPRM, ET 92-9 (NPRM at footnote 16). That number has now been narrowed to five. The Commission indicated that the selection of these bands was guided by the following criteria:

- The national allocation of the band must be for non-government use only (NPRM at footnote 11 and para 21).

- All fixed microwave bands above 3 GHz, both the common carrier and private bands, would be made available (NPRM at para 20)--i.e., the national allocation must include common carrier and/or private radio services.

We are puzzled by the fact that an examination of the national table of frequency allocations (as published in "Tables of Frequency Allocations and other Extracts from Manual of Regulations and Procedures for Federal Radio Frequency Management," NTIA, September 1991) suggests that the Commission did not apply its

criteria consistently in identifying the bands it cited as candidates for reaccommodation.

At least three bands which meet the Commission's criteria remain inexplicably excluded from the FNPRM. These are the bands 6425-6525 MHz, 6875-7125 MHz, and 10.55-10.6 GHz. All three bands are exclusively for non-government use, and with the possible exception of the 6425-6525 MHz band,[1] the national allocation table in each case includes a primary allocation to the FS. Neither the FNPRM nor the FCC Staff Study explains why these three bands were not cited as candidates for reaccommodation, despite the fact that the first two bands were included as entries in Table 2 of the Staff Study.

Based on the foregoing observations, SBCA would recommend that in any future consideration of bands for reaccommodation, the Commission exclude the 3.7-4.2 GHz band altogether.

IX. CONCLUSIONS

SBCA commends the Commission for its foresight in attempting to provide frequency allocations to develop "emerging technologies" such as personal communications systems (PCS), including those

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[1]In the case of the 6425-6525 MHz band, Table 2 of the supporting Staff Study indicates that it is shared by B/C Auxiliary, Cable TV, common carrier, and private radio, although the NTIA Tables show national allocations only to the FSS and the Mobile Service.

employing satellites in low earth orbit (LEO), digital audio broadcasting (DAB), and generic Mobile-Satellite Services (MSS). SBCA appreciates the Commission's initiative because HSD is itself an "emerging technology" which the Commission continues to support. SBCA is perplexed however that the FCC would consider reaccommodating displaced Fixed Service operations to bands allocated for use by the HSD industry in view of the significant and possible fatal damage to the HSD industry that such a reallocation would entail.

Over 3.9 million American households have invested in satellite systems, with some one million new installations occurring every three years. The HSD industry is emerging as a viable video competitor -- a development which has been supported by both the Commission and by Congress. With some 200 video services and more than 75 audio services available via their satellite systems, dish owners today enjoy the most extensive array of programming available from any multichannel video delivery technology. HSD installations also provide the only source of multichannel video to those consumers who live in rural areas outside the coverage area of over-the-air television.

As the Commission pursues further evaluation of ET Docket 92-9, SBCA urges serious consideration of the following conclusions:

1) Existing 4 GHz Fixed Service operations already impose significant costs and operational constraints upon the owners of HSD installations. Even without rechannelization, the addition of fixed microwave systems displaced from the 2 GHz band would impose a further major financial burden on existing and future HSD owners at locations that do not already face serious TI problems.

2) Rechannelization of Fixed Service operations in the 3.7 - 4.2 GHz band would disrupt the established spectrum sharing plan which has been in existence for over 20 years by making it impossible to filter out TI on a number of channels. This would cause irreparable harm to the Fixed Satellite Service and the HSD industry.

3) Interference from additional Fixed Service operations would compromise the ability of satellite operators to deliver digital NTSC and ATV signals directly to the home. The former service is scheduled to begin in 1993.

4) Introduction of Private Operational Fixed systems into the 4 GHz band would also cause new and serious TI problems for cable TV, SMATV, and MMDS operators and result in increased costs to their subscribers.

5) The decisions of WARC-92 have superseded the present Rule Making by making definitive frequency allocations for nearly all

emerging technologies and setting forth the mechanisms for drafting the implementation procedures.

6) Any future consideration of reaccomodation bands should definitely exclude HSD downlink bands, especially at 3.7 - 4.2 GHz.